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Natural Gas Comes to Transportation Market
Jobber Grows With C-Stores, Commercial Accounts
Oil Industry Is Still a Big TBA Power

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National Petroleum News

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Editor's Viewpoint

I don't know about you, but one of these years I'd like to see us get through the month of August without being sandbagged by a major world crisis. Last year, you will recall, Saddam Hussein decided to invade Kuwait, which in turn caused a series of events in the oil industry that most of us would like to forget. This year, exactly 381 days later, hard-liners in the Soviet Union decided to toss out Mikhail Gorbachev and turn the Soviet clock back a generation or two.

Besides putting the world in a state of shock and catching the White House by surprise, the crisis caused stock prices to plummet and the reports of Gorbachev's ousting pushed the dollar sharply higher against the yen. As events continued to unfold in lightning-quick fashion, all I could think about was what this would do to the oil industry.

Logically, for all practical purposes, the crisis should have had no real effect. The Soviet Union, despite its massive petroleum reserves—No. 1 in the world—has very antiquated production facilities and its oil industry is in the same sad shape as the rest of the country's economy. The Soviet contribution to the U.S. market is virtually nil. Still, a breakdown of the Soviet system, civil war perhaps, would have dramatically affected the world order and disrupted crude supplies.

Interestingly, only a year after the invasion of Kuwait, the price of oil appeared to have stabilized around $20/bbl. to $22/bbl. However, the sequestering of Gorbachev sent the usual shudders through Western markets, inspiring oil prices to rise sharply in active trading on fears that Soviet exports would be reduced or even halted. On the New York Mercantile Exchange, light sweet crude oil closed up $1.17/bbl. to $22.47 after rising nearly $3/bbl. in Europe.

Fortunately, this time, the panic that was simmering in the trading markets did not spread like wildfire out into the "real" petroleum marketplace, as it did following the Kuwait invasion, driving up prices at the rack and at the pump. This time, it appears the industry is to be commended for keeping its cool. And, double good fortune, in short order, Gorbachev and the good guys were restored to power, averting what could have been a very sticky world situation.

The attempted coup also caused some anxious moments in the boardrooms of several major oil companies. Companies like Amoco, Chevron, Conoco, Texaco, Marathon and Total have pending or proposed joint venture deals to help the Soviets develop their resources and modernize their antiquated industry. With the restoration of order, it now appears some of these projects will be allowed to proceed.

But it's a safe bet that the executives of those companies will be paying closer attention to developments in the Soviet Union and elsewhere around the world. As should we all. What we don't need is another nerve-shattering August surprise.

On the lighter side, I've decided that my senior editor is not going to be allowed to take a vacation anymore. I don't know, but it sure appears that every time he takes a couple of weeks off, there's a world crisis. Last year it was the invasion of Kuwait and this year it was the ousting of Gorby. Do you think the Kremlin was watching? Maybe not, but somebody sure is. And everytime a potential oil crisis rears it ugly head it makes our office as crazy as I'm sure it does your businesses.

—Peggy Smedley

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A wrestling match is underway between Shell Oil Co. and BP America. The prize is U.S. gasoline supremacy.

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Compressed natural gas is the front runner in the search for cleaner-burning motor fuels. Find out how it is marketed, and who is currently marketing it.

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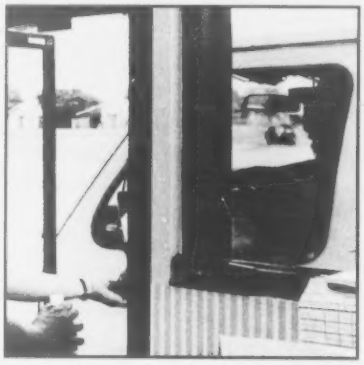

San Antonio-based Ram Oil Corp. has plotted a course for growth by diversifying into gasoline/C-store retailing and commercial/industrial sales.

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• TRENDS

Japanese Develop Battery That Can be Recharged in 15 Minutes

Nissan Motor Corp.'s recent announcement that it has developed a battery that can be recharged in 15 minutes unquestionably means that the ongoing race to be first on the street with an electric car capable of competing with modern gasoline-powered buggies has been given a real shot in the arm.

This isn't the "Eureka, we've got it" kind of a solution that researchers have been seeking for a half-century or more. But it is a quantum leap, no doubt about that. Up to now, one of the biggest problems has been the fact that it required 18 to 24 hours to recharge the batteries that American carmakers have been experimenting with. With this kind of a handicap, as well as the weight and number of batteries that have to be used, there are no lights to be seen at the end of the tunnel at this time.

Nissan is to introduce its electric car and the vastly improved battery at the big fall auto show in Tokyo this month. A four-passenger sedan, it has a top speed of 81-mph, with a cruising range of 100 miles at 45-mph or about 70 miles at 60-mph. It can accelerate from ground zero to 60-mph in about the same time it takes a modern subcompact to do it. That's not good for the jack rabbit enthusiasts of the superhighways but nevertheless it's a workable design for conventional neighborhood driving.

Everybody pretty well agrees that there are numerous technical hurdles that must be overcome before the Japanese battery can achieve commercial success. *The New York Times*, in its report on the Nissan announcement made in Detroit just before Labor Day, made this pungent observation, however: "Japanese carmakers typically do not display vehicles that do not have a high likelihood of being produced."

In themselves, electric cars are anything but new. They've been around, as a matter of fact, for almost as long as have the gasoline-powered vehicles. There have always been high hopes that a workable battery was lurking out there just over the horizon awaiting the day that lab researchers would shout "Eureka." Clean Air requirements, environmental demands and the current tizzy over reformulated and alternative fuels have turned up the heat now on the quest for a satisfactory electric car.

California, for example, has already put it in writing that 2% of all 1998 model cars must have no tail pipe emissions, and that by 2003 10% of all cars will be covered by that law. The Big Three automobile makers initiated a joint project in January to accelerate their quest in battery technology. GM has already selected a shutdown plant in Lansing, Mich., to build its new Impact two seater, but has not announced a startup schedule.

Nissan's new car is powered by a nickel-cadmium battery vis a vis the lead-acid batteries of the American industry. But that, in itself, constitutes a major problem for Nissan. Nickel-cadmium batteries are five times more toxic than the lead-acid ones, raising serious question as to how they can be disposed of once their useful life is finished. Another big problem is that the nickel-cadmium batteries must have a high-energy power source, not a conventional electric outlet, for the recharging process. These are not readily available everywhere at this time.

Nissan says it is intensifying its research to find an acceptable recycling method for its new battery to minimize the waste and toxicity problems and also, if possible, an easier way to find sources for the high power it must have for recharging in 15 minutes. A company spokesman agreed that "a number of things have to looked at before this car can become practical."

The Japanese, in recent years, have all but up-ended just about everything they've gotten into. Look at the millions of small car imports they've inspired; consider what they have done to the television and electronic industries, especially the chips of modern science. Can it be speculated that now that they're knee-deep in nickel-cadmium batteries and the electric cars of tomorrow, that soon may come an "Ah so" before a Yankee "Eureka?"

—J. Richard Shaner

• MARKETPLACE AT A GLANCE

AVERAGE GASOLINE PRICES IN THE U.S. (per gal.)

JULY	Gasoline (All types)	Leaded Regular	Unleaded Regular	Unleaded Premium
U.S. City Avg.	$1.185	*	$1.127	$1.313
Regions				
Northeast	1.271	*	1.193	1.403
North Central	1.175	*	1.136	1.296
South	1.176	*	1.105	1.286
West	1.129	*	1.088	1.270

** Data no longer collected or available.*
Source: U.S. Dept. of Labor, Bureau of Labor Statistics.

STOCKS (Add 000 bbl.)

	8/30/91	8/31/90
Gasoline (Total) [a]	209,622	210,459
Jet Kerosine	42,069	41,982
Distillates	126,657	126,671
Residual	46,217	49,229

[a] *Leaded regular prices no longer collected by Bureau of Labor Statistics.*
Source: American Petroleum Institute.

EIA Expects Little Change In U.S. and World Markets

If the Russian upheaval is put aside for the moment, a fresh update on what's ahead for oil marketers in what's left of 1991 and for all of 1992, the so-so projections of the past really haven't changed much. In brief, deja vu over and over again, month by month.

The general expectancy of the industry's international experts and the long-range soothsayers of the American financial marts is that the Soviet unrest won't have much impact on global petroleum operations.

Most of the Soviet Union's oil fields, production, pipelines, refineries and pipeline system were in the hands and control of the Russian republic in late August. (Don't forget, there's a vast difference between Russia itself and the U.S.S.R., which is the Union of Soviet Socialist Republics). The peeling off of the fringe nations in the South and West should not affect the petroleum operations to any degree. And the one thing that Russia needs to do is keep its exports in good order lest its economic balance go down the drain.

Russia's petroleum production has been declining in recent years, but since the bulk of its exports go to Europe and Asia, the United States hasn't felt any of it.

Where American oil marketers are concerned, the U.S. government's Energy Information Administration's third-quarter forecast (see table) tells it all in a hurry. The government agency says:

"Only gradual growth is expected in the [U.S.] economy for many reasons. First, housing sales and residential construction, sectors which grow fast after recessions, still suffer from over-capacity. Second, consumption is not likely to rebound fast because debt levels remain high. Third, fiscal policy is not likely to provide further stimulus since both the federal and state governments are under pressure to cut spending. Finally, recent losses and increased capital requirements in the financial sector will slow the expansion of credit over the next several quarters."

U.S. crude oil production is expected to get a brief respite from the decline of recent years. Output in 1991 will be about the same as 1990's 7.4-million b/d. Next year, however, the erosion resumes, with production expected to decline between to somewhere between 6.9-million and 7.3-million b/d.

Here's a more definitive forecast on prices generally:

"Based on crude oil prices of $19.12/bbl. in 1991 and $20.25/bbl. in 1992, most petroleum product prices should decline in 1991, then rise slightly in 1992.

"Motor gasoline prices, in contrast to the sharp fluctuations in 1990, are expected to exhibit comparative stability this year, although normal seasonal variations can be expected. Annual average pump prices for gasoline should be about even with the 1990 levels, with decreases in the relatively higher refiner margins of 1990 offsetting increases in retail margins. In 1992, higher crude oil costs and inflation are expected to add an additional 3¢/gal. to the pump prices.

"Heating oil and diesel fuel prices should follow gasoline prices, with prices increasing moderately in 1992. However, severe winter weather could increase distillate prices by considerably more.

"Residual fuel oil prices are expected to average about $3.30/bbl. less than crude oil prices in 1991, as the supply of this fuel is projected to be more than adequate. This price difference is expected to increase by $1 to just over $2.40/bbl. in 1992, as the economy picks up and the supply returns to normal range."

The government's third-quarter forecast said U.S. petroleum demand averaged 17.0-million b/d in 1990 and is expected to average 16.6-million b/d in 1991. In 1992, the forecast said, mid-case petroleum demand is expected to increase to 16.9-million b/d.

The 1990 average demand of 17.0-million b/d represents a 1.9% decline from that of the previous year. The slowdown in economic activity, price hikes during the second half of the year resulting from the Persian Gulf crisis and milder fourth-quarter weather in 1990 accounted for much of that decline.

Looking Ahead, the U.S.S.R. Notwithstanding

Gasoline: Down in '91, Rebounding in '92

PRICES

Fuel Oil: Sluggish, Wholesales and Retails Alike

Nominal dollars per gal.

	—1991—				—1992—				—Full Year—		
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	'90	'91	'92
Gasoline (a)	1.21	1.19	1.22	1.21	1.17	1.25	1.28	1.27	1.22	1.21	1.24
No. 2 Diesel	1.20	1.11	1.12	1.20	1.21	1.18	1.18	1.26	1.17	1.15	1.20
No. 2 Whsl.	0.69	0.59	0.57	0.63	0.65	0.61	0.60	0.66	0.70	0.61	0.63
No. 2 Retl.	1.11	0.94	0.93	1.02	1.06	1.02	0.98	1.07	1.06	1.04	1.05
No. 6 Resid.	0.42	0.31	0.35	0.41	0.43	0.40	0.41	0.45	0.44	0.37	0.42

(a) Average retail, all services and all grades.

Gasoline: Flat in '91, About the Same in '92

DEMAND

Fuel Oil: Down a Bit in '91, Up a Bit in '92

Millions of b/d

Gasoline	6.83	7.70	7.31	7.19	6.90	7.25	7.30	7.19	7.23	7.16	7.16
Distillate	3.11	2.83	2.66	3.21	3.54	2.93	2.77	3.29	3.02	2.95	3.13
Residual	1.19	1.15	1.00	1.16	1.26	0.99	1.01	1.15	1.23	1.13	1.10
Total Product Demand (includes all other products)											
	16.4	16.3	16.5	17.1	17.2	16.5	16.7	17.3	17.0	16.6	16.9
Net Impts.(a)	5.63	7.10	6.89	6.94	7.02	7.34	7.48	7.28	7.1:	6.64	7.28

(a) Crude and products; Net equals imports minus exports.

Battle For No. 1: Are BP and Shell in a Showdown

Although this may sound far-fetched, some oil industry economists are already speculating that Shell Oil Co. and BP America may be engaged ere long in a no-holds-barred struggle for preeminence in the U.S. gasoline market, something akin to a championship arm-wrestling match between the most muscled of them all.

There is real irony in this, of course; i.e., the very idea that two mighty British and British-Dutch oil companies would be fighting it out via their wholly owned American subsidiaries for the honor and glory of being the No. 1 retail gasoline marketer in the United States—and probably the world as well.

Somewhere in this scenario there has to be a fleeting thought of deja vu, recalling the pre-revolutionary days when British Royalists ruled the Colonies from afar and with an iron hand, too.

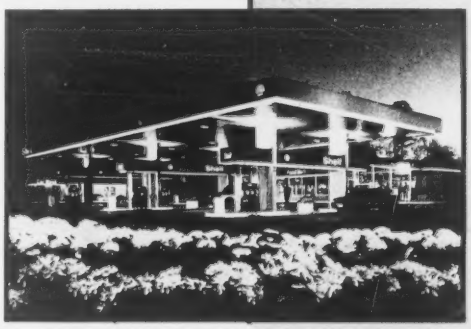
What suddenly makes this latter-day contest a realistic possibility, however, are the slippage problems that Shell has been having in recent years versus the concurrent growth activity that seems to be permeating just about everything that BP America has been doing.

Of course, for Shell and BP to achieve a title fight status of their own in the relatively near future, there are five other companies that have to be disposed of or bypassed first, namely Chevron, Texaco, Exxon, Amoco and Mobil.

These companies are currently second, third, fourth, fifth and sixth in the statistical comparisons of U.S. gasoline market shares and standings.

They are all ahead of BP and behind Shell in the rankings. Technically, Chevron should be the one to replace Shell as the No. 1 gasoline marketer this year, because it was the first runner-up last year. But Chevron has been rather static in its marketplace movements in first-half 1991, even though it was only a half-billion gal. behind Shell in the 1990 gasoline derby. Mighty Exxon also was a slow mover in 1990. But singly or collectively, none of these giants are likely to concede anything to one another in the gasoline marketplaces.

The problems they pose for BP, in particular, and to each other are not really insurmountable, however. Look at it this way: There were only 3.3-billion gal. of gasoline between first-place Shell (10.2-billion gal.) and seventh-place BP America (6.9-billion gal.) in 1990. A chain of 3,500 stations, or an aggregate of stations roughly equaling that number, each doing about 95,000 gal./mo. could easily generate that much volume. That might be too much for some companies to bite off, but BP has already swallowed up more than 5,000 stations in a single gulp—the Chevron/Gulf acquisitions in the Southeast in 1985.



Virtually all of Shell's 9,400 retail service stations are open night and day, seven days a week. Most have substantial volumes as a result, many easily exceeding 1-million to 1.5-million gal./yr.

Things may happen as early as this year—the end of '91, that is—but the greater likelihood is that 1992 or 1993 will see BP surging all over the place, upstaging Mobil, Amoco and Exxon and maybe Texaco and Chevron as well. BP is beating the bushes on the East Coast and the Northwest, perhaps looking for new chains, big or small, to buy, while the others are browsing in the open fields.

Shell and the others will have to become more aggressive in their activities from now on or they'll likely fall out of contention for the title of the biggest gasoline marketer anywhere. Not many gasoline analysts may realize it, but Shell's gasoline sales are already down 3.3% in the first half of 1991. That's roughly 600-million gal. and if the second half is no better than the first, Shell, Chevron, Exxon and Texaco may be in a tight scramble for first place by the end of this year.

Much depends on how (and if) Shell extricates itself from the profitability whirlpools it has been caught up in the past several years. Much depends, too, on how fast and how soon BP America can turn up the heat in its determination to gain a longer and stronger foothold in the gasoline marketplace, including the prestigious No. 1 position in U.S. sales.

International competitors

No one in the BP households in Cleveland or London is willing to say out loud that the British overlords have just that sort of a scheme in mind. But as surely as two and two make four, the probability is there. Shell and BP/London are tough competitors overseas, in exploration, production, refining and marketing. The

By J. Richard Shaner
Executive Editor

for Gasoline Supremacy?

Royal Dutch/Shell Group, with global assets of $106-billion, is half-again bigger than BP, although the latter company is the largest in the UK and the second largest in Europe.

That has intensified rather than diminished their appetites for competition. Isn't it logical to assume that these international traits would overflow into the American marketplaces as well?

BP has now rebranded just about all of its 7,500 service stations in 33 states, focusing attention domestically and internationally on BP. With this chore completed, the next step is to hype gasoline sales. BP generally sells a couple of cents off the marketplace.

It should be borne in mind that BP/London's management has something else going for it that obviously gives it an advantage over its contemporary opponents in London and The Hague. This is a high-level understanding of and appreciation of the American marketplace as never before.

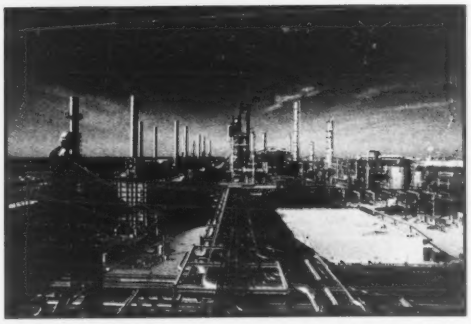
When BP/London decided to change things around in the U.S.A. five years or so ago, the board of directors brusquely (some say almost brutally) dumped resident executives Alton M. Whitehouse (chairman) and John H. Miller (president). The latter gentlemen, it was said at the time, had flown to London for what they thought was to be a routine planning session. Once there, they were told, as the story goes, not to unpack their bags but to take the next plane for home because they were no longer working for BP. In their places, BP sent over a tough but charismatic deputy managing director, Robert B. Horton, to repair the damages and to direct the consolidations and realignments of the subsidiary companies and the work forces in the U.S.

Horton worked hard, shook hands and made innumerable business and personal friends in Cleveland and the U.S. oil industry. By the end of 1987 it was announced that he would return to London in early 1988 to become chairman of BP America in corporate headquarters. It was only a matter of time until he became a managing director, then chairman of BP/London, top man in the whole conglomerate.

Horton made it known immediately that his personal thrust would be dedicated to making BP "the most successful oil company of the 1990s and beyond." With his intimate knowledge of the American scene and corporate recognition that the American gasoline market was the greatest in the world, no one doubted for a moment that BP's American interests would receive bountiful blessings from overseas. That's what is happening right now and appears to be only the beginning.

Room at the top?

The story of how BP America got its start in the marketing of gasoline and other refined products in the U.S. is both con-



Shell is the third-largest refiner in the U.S. with a capacity of 1.8-million b/d in five states. Shell's 120,000 b/d unit in Wilmington, Calif., is up for sale.

fusing and tantalizing, especially in the more recent years. Here's a condensed summary:

BP/London used to have a division known as BP North America (later known as BP Oil Corp.), which was headquartered in New York and primarily interested in exploration and production. It was one of the early-on discoverers in 1968 of great gobs of crude oil in the Prudhoe Bay area of Alaska.

On Jan. 1, 1970, crude-rich BP Oil Co. was merged into crude-poor Standard Oil Co. (Ohio) in a complex agreement that gave BP a 25% interest in Standard of Ohio with a proviso that this 25% interest could be increased to 53% when Alaskan production reached 600,000 b/d.

This, in substance, gave Standard of Ohio immense crude oil reserves in Alaska, doubled its refinery capacity and assets, expanded Sohio's marketing capability from six to 21 states and included an interest in an extensive transportation system. It also enabled Standard of Ohio to break out of its one-state marketing orbit and soar to the skies.

But the price ultimately proved to be high—very high. In January 1979, Prudhoe Bay production exceeded 600,000 b/d and BP/London then owned a 53% controlling interest, later increased to 55%, in the American firm.

In March 1987, BP/London bought the remaining 45% it didn't own. After a short hassle over the price of shares, BP owned Standard of Ohio lock, stock and barrel and registered ownership under BP America, Inc., a wholly owned subsidiary. In 1990, BP decided on the use of BP as a global logo and began a domestic program of unifying all of its U.S. gasoline activities under that name.

During the '70s and the '80s, The Standard Oil Co. (Ohio) thrived as a one-state marketer under the Sohio name, but with secondary brand names as Boron and BP Oil. In April 1985, Standard bought 5,600 Gulf Oil service stations in the Southeast from Chevron Oil Co. and retained this brand name, too, until the 1990 rebranding.

In 1990, BP rebranded and reimaged 4,350 former Boron and Gulf-branded stations. By the end of 1991, the company says it will have completed the changeover to BP's green "livery" a year earlier than expected. Marketing investments have been averaging about $1-billion/yr. worldwide over the past two years. A good portion of these investments are being spent in the United States and are being used to "reinforce" and "expand" its retailing positions in Ohio, the West Coast and Southeast, says BP.

Along the way, Standard also bought

BP operates five refineries in Ohio, Pennsylvania, Louisiana and Washington. The most recent addition, a 77,400 b/d unit near Ferndale, Wash., purchased from Mobil two years ago, marked its first penetration of the Pacific Northwest and the beginning of its campaign to be a major gasoline marketer on the West Coast.

BP America had this handsome skyscraper constructed in downtown Cleveland to house all of its principal American affairs and enable its key executives to be almost within a stone's throw of each other.

Earnings Reports: Where the Money Is

Around the World
(millions of dollars)

	BP/London	Royal Dutch/ Shell
Full-year 1990	$5,302.0	$6,533.0
Full-year 1989	4,817.0	6,539.0
% Change	10.1	—
6-mo. 1991	1,510.0	2,529.0
6-mo. 1990	1,077.0	2,295.0
% Change	40.2	(10.2)
1st-quar. 1991	986.0	1,649.0
1st-quar. 1990	599.0	2,055.0
% Change	64.6	(19.8)
2nd-quar. 1991	515.0	910.0
2nd-quar. 1990	478.0	940.0
% Change	7.7	(3.2)

The American Subs

	BP Amer.	Shell Oil
Full-year 1990	$2,631.0	$1,036.0
Full-year 1989	2,188.0	1,405.0
% Change	20.2	(26.3)
6-mo. 1991	1,077.0	57.0
6-mo. 1990	1,291.0	363.0
% Change	(16.6)	(84.3)
1st-quar. 1991	65.0	125.0
1st-quar. 1990	732.0	203.0
% Change	(11.1)	(39.4)
2nd-quar. 1991	426.0	(68.0)
2nd-quar. 1990	559.0	161.0
% Change	(23.8)	—

Note: BP's earnings are stated in replacement costs; U.S. segment includes nutrition and business and corporate items. Shell's earnings are conventional net.

Shell's Autocare stations, a big hit with thousands of customers, have been lauded by consumer organizations for their up-front, made-in-advance cost commitments.

Corporate—Where the Money Is

	Shell 1990	Shell 1989	% Chng	BP America 1990	BP America 1989	% Chng
			(billions of dollars)			
Revenues	$24.8	$21.9	12.9	$18.6	$16.3	14.2
Indus. Rank	6	6	--	8	8	--
Earnings	1.0	1.4	(26.3)	2.6	2.2	20.2
Indus. Rank	10	8	--	2	3	---
Assets	28.5	27.6	3.2	21.7	18.4	17.9
Indus. Rank	5	5	--	8	8	--
Employees (000)	31.6	31.3	0.1	37.2	40.0	7.0

Downstream—Where the Action Is

	Shell 1990	Shell 1989	% Chng	BP America 1990	BP America 1989	% Chng
Refined Products Sold			(billions of gal.)			
	18.2	18.5	(1.6)	14.2	13.8	2.9
U.S. Rank	2	2	--	5	5	--
Gasoline Only			(billions of gal.)			
Volume	10.2	10.1	0.1	6.9	6.6	4.5
Share of Mkt.	8.8%	8.8%	--	5.7%	5.7%	--
U.S. Rank	1	1	--	7	7	--
No. of Svc. Stas.	9,389	9,763	(3.8)	7,531	7,464	0.9
No. with C-stores	1,330	1,164	14.3	880	700	25.7
No. of States	41	40	2.5	33	26	26.9
Refining Capacity			(thousands of b/d)			
Capacity	1,079	1,083	(0.4)	797	797	--
% of Indus.	NA	7.10	--	NA	4.98	--
Rank	3	3	--	8	6	--
Crude Runs			(thousands of b/d)			
Runs	904	927	(2.8)	699	717	(2.5)
% of Indus.	NA	6.86	--	NA	5.0	--
Rank	3	3	--	6	6	--
% Utilized	83.8	85.6	(2.1)	92.0	94.0	(2.1)

Truckstops of America, the second-biggest truckstop chain in the U.S. with 43 locations in 26 states and introduced its ProCare centers, a new approach to standalone car maintenance and repair facilities.

What BP is thirsting for now is major representation on the West Coast to take advantage of its Alaskan crude oil riches. In late 1988, it took a big step in this direction. It bought Mobil Oil Co.'s 77,500 b/d refinery in Ferndale, Wash., and swapped enough of its southeastern service stations with Mobil to give it a presence of sorts in the Pacific Northwest. Mobil pulled out.

At this point in time, BP cannot help but be ready for action. Its unification problems in the U.S. are pretty well completed, its finances in the U.S. and abroad are strong, its earnings have been good (up 20% in 1990, while Shell lost 26%), and its appetite for growth is unquestioned. Unless the world falls apart, there is only one way it can go—up, up and up.

Under president John Bookout and before the establishment of Shell Oil Co. as a fully owned subsidiary of the Royal Dutch/Shell Group of companies in 1988, Shell USA had been getting growth and good marks everywhere. It became the nation's No. 1 gasoline marketer in 1986 and has held that title ever since. It basically is the only company that has been able to maintain gasoline sales at an annual rate of 10-billion-plus gal. Chevron did it for one year, immediately after it bought Gulf Oil in 1984, but that hardly counts.

Shell's gallonage slipped 4.4% in 1989 and increased only 0.5% in 1990. In the first six months of 1991, Shell appears to have slipped again, and if the second half equals the first half, Shell's hold on the No. 1 designation may evaporate.

Not helping this negative situation at all is the fact that Shell has found it necessary to trim its staff by 5,000 people this year and next. That may improve its cost-cutting efficiency but it cannot help but harm its overall image and services.

Shell also is trying to sell its 120,000 b/d refinery in Wilmington, Calif., knee-deep in the Los Angeles Basin gasoline market, which is said to be the largest in the world. Shell "owns" about 15% of the Basin's gasoline volume which has been estimated at 9-million gal./day. That amounts to roughly 1.4-million gal./day. Once Wil-

Although Shell's service station total declined 3.8% in 1990, the number of Food Marts hit an all-time high of 1,330, up 14.3% over 1989. Stated another way, one out of every nine Shell stations had C-store facilities.

BP's retail network includes 40-some Truckstops of America stations in 21 states stretching from New Jersey south and west to California. All are big volume gasoline and diesel fuel vendors.

mington goes out the window, either as a sale or a shutdown, Shell will have to depend on the open market or, hopefully, a swap agreement with the buyer for gasoline supplies. Shell also says it may have to give up wholesaling and maybe some jobber sales in the Basin and southern California.

West Coasters are wondering why Shell is doing all this in the first place, and what the consequences may be [*NPN*—Aug. '91, p26].

Like BP, Shell and its antecedent companies have been on the American scene since the turn of the century. The early bird beginners were American Gasoline Co., a West Coast marketer, and Roxana Petroleum Co., a Midwestern crude producer. In 1985, the British and Dutch bought out the portion of Shell USA that it didn't own. Frank Richardson succeeded Bookout as president and it's his job to get Shell turned around or face the ultimate day when Shell and BP will be tete-a-tete on who's the biggest and the best.

The following 10 years should be a very dramatic period for both Shell and BP officials. *NPN*

How They Stack Up on A State-by-State Basis

Shell, with 9,389 outlets in 41 states, is only nine states away from being a truly national company with retail stations in all 50 states. BP America, on the other hand, is more of a regional company at this time with most of its 7,531 gasoline stations in the states east of the Mississippi. It is now in the process of establishing itself on the West Coast to take advantage of its Alaskan crude output. Here's the state-by-state rundown:

	BP America	Shell
Northeast		
Maine	3	0
New Hampshire	12	12
Vermont	39	0
Massachusetts	79	221
Rhode Island	0	55
Connecticut	53	132
Mid-Atlantic		
New York	44	245
New Jersey	69	275
Pennsylvania	405	100
South Atlantic		
Delaware	10	37
Maryland	25	222
Dist. of Col.	0	9
Virginia	146	274
West Virginia	69	17
North Carolina	763	336
South Carolina	432	168
Georgia	818	341
Florida	534	625
East North Central		
Ohio	997	421
Indiana	8	328
Illinois	2	604
Michigan	85	538
Wisconsin	0	127
East South Central		
Kentucky	526	286
Tennessee	647	228
Alabama	473	282
Mississippi	445	216
West North Central		
Minnesota	0	0
Iowa	0	12
Missouri	1	182
North Dakota	0	0
South Dakota	0	0
Nebraska	0	0
Kansas	0	0
West South Central		
Arkansas	0	91
Louisiana	0	409
Oklahoma	1	2
Texas	2	594
Mountain		
Montana	0	0
Idaho	0	24
Wyoming	0	0
Colorado	0	0
New Mexico	3	74
Arizona	1	53
Utah	0	17
Nevada	0	38
Pacific		
Washington	232	211
Oregon	241	179
California	356	1,360
Alaska	0	0
Hawaii	0	57
Totals		
No. of stations	7,531	9,389
No. of states	33	41

The International Connections

● British Petroleum Co. p.l.c., London, England, has owned, since June 1987, 100% of BP America, which is chartered in Delaware and headquartered in Cleveland. BP/London is a $59-billion entity with an operating presence in 70 countries around the world. BP America represents about 35% of BP/London's global assets. BP America, with 7,531 service stations and 880 convenience stores in 33 states, is the nation's seventh-biggest retail gasoline marketer, its biggest crude oil producer and one of its biggest refiners. There have been a variety of mergers and realignments in the past 10-15 years, but BP America's U.S. antecedents go back to the early John D. Rockefeller days in the late 1870s. In fact, The Standard Oil Co. of Ohio, which BP America absorbed several years ago, was the original Rockefeller oil company.

● The Royal Dutch/Shell Group of companies, has, in substance, twin headquarters in London, England, and The Hague in The Netherlands. This conglomerate is owned 60% by Royal Dutch Petroleum Co., The Hague, and 40% by the "Shell" Transport & Trading Co., London. Its assets exceed $106-billion and it also operates in 70-plus countries around the world. The Group owns 100% of Shell Petroleum Co., which is chartered in Delaware and is the 100% owner of Shell Oil Co., Houston. The latter company is the nation's No. 1 retailer of gasoline and has been for the past five years. Shell's American history dates back to 1912.

● The Royal Dutch/Shell Group of companies ranks fourth internationally in terms of assets ($106-billion). General Motors Corp. is the world's largest company with $180-billion in assets, followed by Ford Motor Co. ($174-billion) and General Electric Co. ($154-billion) Exxon ranked fifth with $88-billion while BP America was ninth, with $59-billion. In terms of sales and revenues, the Royal Dutch/Shell Group generated $107-billion in 1990 to leapfrog over Exxon and Ford and land in second place, immediately behind General Motors ($125-billion). BP/London was 20th with $60-billion in sales.

Both companies are optimistic about their futures, the negatives notwithstanding.

Stephen L. Miller, Shell's vice president for marketing and refining, had this to say: "The future will certainly bring us more of the same challenges that we've been facing right along—operating in volatile markets, making expenditures to protect the environment and taking steps to meet legislative and regulatory initiatives." Miller says Shell, with the help of its dealers and jobbers, will continue to adapt to change and that the company itself "plans to increase investments in our network to make sure our customers' needs are met."

BP's top executive, Robert Horton, says his goal "is to make BP the most successful oil company of the 1990s and beyond." Need more be said?

Look Out: Here Comes Natural Gas in Transportation Market

Compressed natural gas (CNG), the closest rival to gasoline and diesel fuel in the transportation market, is gaining significant ground. While it is a long way from making a mark, it is laying the foundation for an eventual run on market share. It is front runner in the quest for cleaner-burning motor fuels.

Natural gas utilities are the driving force behind the present growth of CNG fueling stations. They, in turn, are driven by a huge oversupply of natural gas and stricken prices. Until natural gas gains wider distribution later in this decade, perhaps the only hope for recovery of prices is expansion into the transportation market. It is also the potential long-term redeemer.

The powerful American Gas Assn. (AGA), representing utilities, natural gas pipelines and natural gas suppliers, is also actively promoting CNG as a transportation fuel. The Natural Gas Supply Assn., representing producers, is letting AGA take the lead.

AGA has published a directory of 325 CNG fueling stations in the United States. The book lists 120 companies that are manufacturing products or providing services for the natural gas vehicle (NGV) market.

Heavy promotion is also being done by the Natural Gas Vehicle Coalition, organized in 1988. Its members are natural gas distribution companies; pipelines and gas producers; manufacturers of buses, trucks, vans, cars and engines; NGV service organizations and consultants; research and development organizations; nonprofit advocacy organizations; state and local government agencies or their representatives; and environmental organizations.

Opportunity for marketers

Despite their deep economic interest in CNG marketing, utilities and other natural gas groups for the most part do not appear to be interested in retailing. This is opening the way for oil companies to set up CNG fueling facilities at existing stations and even develop chains. Some new programs are tailored to help independent marketers do so.

The cost of a CNG fueling facility is forbidding. Without subsidies or easy financing, or both, it's out of the question for a company to enter CNG marketing with a return in mind.

Simply, it takes a lot of NGV production or conversions to create sufficient demand, and it takes a lot of CNG fueling facilities to make it possible for NGVs to travel the roads freely.

Some of the utilities are also offering financial incentives to encourage fleet operators to convert to natural gas. This target enables the utilities to accomplish expansion in sizable steps, rather than one vehicle at a time. The cost of natural gas is appealing at 70¢/gal. gasoline equivalent.

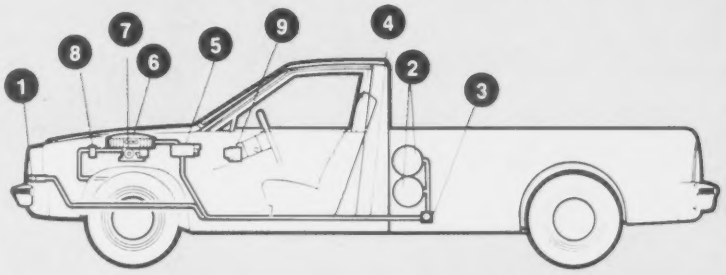
Some states are offering incentives for conversion to cleaner-burning fuels, including natural gas.

The heavy publicity surrounding CNG fueling developments is strong evidence that the financial backing is formidable.

By Mark Emond
Staff Reporter

Vehicle Conversion to Natural Gas is Easy, and Converted Vehicles Can Use Either Natural Gas or Gasoline

Conversion of a gasoline vehicle to natural gas is a simple process that does not require removal of any original equipment. Natural gas cylinders are mounted in the rear of the vehicle and a natural gas fuel line is connected to the engine's existing combustion system through regulated mixer equipment. A fuel gauge switch installed on the dash permits selection of either natural gas or gasoline operation, which results in a bi-fuel vehicle that has the advantage of an extended fuel range.



How a Natural Gas Vehicle System Works

① Natural gas from a fueling station enters a vehicle's natural gas fuel system through a fill valve.

② The natural gas flows into compressed natural gas (CNG) cylinders located in the rear of the vehicle.

③ When natural gas is demanded by the engine, it travels from the CNG cylinders through the master manual shutoff valve.

④ The natural gas then enters the engine area through the fuel line.

⑤ Natural gas then enters the pressure regulator, where it is reduced to atmospheric pressure.

⑥ When the natural gas solenoid valve opens, the natural gas passes through the pressure regulator into the gas mixer.

Note: The natural gas solenoid valve is also used to shut off the natural gas supply, if the driver of the vehicle selects gasoline, rather than natural gas, to power the engine.

⑦ Natural gas mixed with air then flows down through the gasoline carburetor (or through the throttle body in the case of fuel injected engines) and on into the engine's combustion chambers.

⑧ Gasoline supply to the engine is controlled by either a solenoid valve (carbureted vehicles) or by a fuel injector relay (fuel injected vehicles).

⑨ A fuel gauge panel on the dash permits a selection of either natural gas or gasoline for operation of the vehicle.

Emission Comparison of Five Motor Fuels

(grams/mile)

Fuel	Reactive Hydrocarbons: Exhaust	Reactive Hydrocarbons: Evaporative	Carbon Monoxide	Nitrogen Oxides
Gasoline	0.35	0.04	1.40	0.66
Methanol (M85)	0.25	0.09	1.00	0.45
Ethanol (E85)	1.02	0.05	1.80	0.61
Propane	0.20	0.0	1.40	0.27
Natural gas	0.19	0.0	0.01	0.44

Source: California Air Resources Board

Most of the money is coming from natural gas utilities, but some is from pipelines and suppliers, and more could be coming.

With expansion of CNG vehicles considered a socially worthy objective in the attainment of cleaner air, public utility commissions are likely to permit utilities to cover their subsidization costs by increasing rates. In an historic announcement, one has done so already—in California—and there will be more.

The California Public Utilities Commission (CPUC) unanimously authorized two utilities to obtain funding for CNG programs by raising gas rates to consumers. These are two of the largest such programs in the nation. Pacific Gas & Electric, San Francisco, will spend $12-million the next two years; San Diego Gas & Electric will spend $6.8-million the next two years. Southern California Gas is expected to obtain similar approval for its $18-million CNG program.

Nothing quite like it exists in gasoline and diesel-fuel marketing, where there are no official price structures to guarantee profits. It could be a potent combination. As a practical matter for marketers, it could be a rising star to hitch onto—if they can (see sidebar p 39).

CNG rolls

As the CNG juggernaut gains momentum, new fueling facilities are springing up in many areas, usually joint efforts involving local utilities. Fleet vehicles are considered most suitable for conversion because they log many miles of driving in congested cities and refuel at the same location.

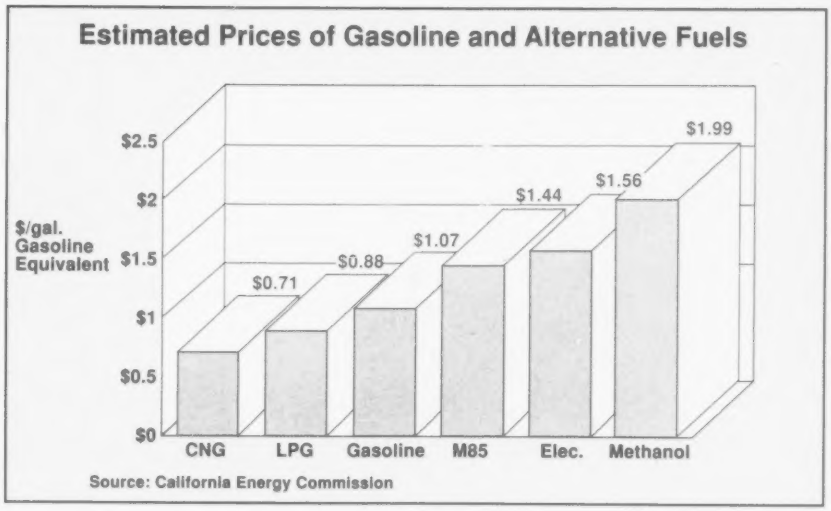
Here's a rundown of recent CNG programs in the approximate order of their announcement this year:

- Bay State Gas Co. opened New England's first public CNG fueling station, in Springfield, Mass., at the rear of the company's property. The facility can fuel 120 vehicles a day. The company estimates that 10-million cu.ft. of natural gas will be dispensed there the first year.
- Provo, Utah, after initial testing of CNG vehicles, will convert all 1987-model and newer vehicles in its fleet to CNG. The city has signed a contract with Mountain Fuel Supply Co. to convert 15 city vehicles, mostly police cars, to CNG. After an eight-month evaluation, the city will decide whether to purchase the conversion equipment installed in its vehicles by Mountain Fuel and proceed with additional conversions.
- The Houston Metropolitan Transit Authority (HMTA) is equipping 10 of 20 new full-size StarShip Apollo transit buses to run on liquefied natural gas (LNG) carried in cryogenic fuel tanks at temperatures of -250° F to -260°F. The tanks are described as 70 gal. thermos bottles. This is in compliance with what's called the "Texas Plan" adopted by the legislature, which requires centrally fueled vehicles to phase-in use of alternative fuels.

The dual-fuel bus is supplied by Stewart & Stevenson Services Inc., Houston, at a cost of about $250,000. CNG and LNG conversions cost between $30,000 and $40,000. HMTA has eight smaller buses operating on CNG and two on LNG.

Beginning Sept. 1, 1991, the plan calls for certain fleets to purchase only alternative fuel vehicles and convert 90% of their vehicles to alternative fuels by 1998. The fleets required to do this are state agencies with more than 15 vehicles, school dis-

The oil companies are investing heavily into natural gas service stations and are testing consumer acceptance of this at a variety of locations across the country.



tricts with more than 50 buses, private fleets with more than 25 vehicles and all metropolitan transit authorities in Texas.

● A group of companies is planning to open several public and private CNG refueling stations and begin vehicle conversions. The group intends to develop an NGV retail refueling strategy for Brazoria, Chambers, Fort Bend, Harris, Liberty, Montgomery and Waller counties, Texas.

Leader of the group, with a 50% share, is Natural Fuels Corp., Denver, owned jointly by Julander Platt Nelson, an investment banking firm; Public Service Co. of Colorado; and CIG, a subsidiary of Coastal Corp. Houston's natural gas utility, Entex, a division of Arkla Inc., owns 25%; Houston Pipe Line Co., a subsidiary of Enron Corp., owns 15%; and Vista Group Inc., a Houston investment firm, owns 10%.

Natural Fuels operates three public and two private CNG fueling stations in Denver and plans to open nine more this year. The company also operates a conversion and service center that can convert as many as 100 vehicles a month. It plans to open two more centers this year.

● Southern Union Gas Co. built a CNG station open to the public in Austin, Texas. Natural Gas Resources (NGR), Austin, installed the compressor and pump and trained mechanics to install its patented vehicle conversion kit. The station is operated by Frank Sapp, who leases it.

● Unocal Corp. and San Diego Gas & Electric (SDG&E) jointly opened a public CNG fueling facility at a Unocal station in Vista, Calif. At least one more is planned in the San Diego area. SDG&E provides the engineering, maintenance and customer billing service and shares the startup costs.

With Southern California Gas Co. (SoCal), Unocal is opening one and possibly two CNG facilities in the Los Angeles area. The stations will be self-serve and will accept computerized cards issued to SoCal customers. SoCal Gas is providing design, engineering, general maintenance and customer billing, and Unocal dealers will operate the facility.

● Pacific Gas & Electric Co. (PG&E), San Francisco, expanded its network of CNG stations in March, opening to the public five new refueling stations at company sites in San Francisco, San Jose, Hayward, San Rafael and Bakersfield, Calif. The utility already operates CNG stations for public use in Concord and Richmond.

PG&E planned to open 19 more in the near future. Says PG&E chairman and CEO Richard A. Clarke, "This clean, low-cost fuel is already gaining popularity among owners and operators of fleet vehicles. By making it more convenient we expect to increase its use, which will

CNG Vehicles Worldwide

More than 700,000 natural gas vehicles (NGVs) operate in 38 countries on six continents throughout the world, reports the American Gas Assn. (AGA)

The leading countries are Italy with 300,000, the Soviet Union with 200,000 and New Zealand with 110,000. Other countries with sizable NGV populations are the United States with 30,000, Canada with 20,000 and Argentina with 15,000.

The oldest NGV program is in Italy, where natural gas from the Po River valley has been used to fuel Italian cars, trucks and buses since 1935. Italy now has 240 public CNG refueling stations.

Vehicle manufacturers who make NGVs are British Leyland, Mercedes-Benz and Toyota. Chrysler, Ford and General Motors are conducting research on NGVs. GMC Truck Div. is building a dedicated natural gas version of its Sierra 3/4-ton pickup truck.

With plentiful natural gas supplies in the world, NGV expansion is planned. The Soviet Union is planning a total of 600,000 NGVs, Argentina 135,000, Indonesia 200,000, Thailand 50,000 and Pakistan 21,000.

Natural Fueling Stations are fully automated. Customers are provided with Natural credit cards and are billed monthly for their fuel.

clean up our air while reducing dependence on oil."

PG&E's goal in the 1990s is to convert 125,000 fleet vans and trucks to natural gas. They would replace 187-million gal. of diesel or gasoline a year. The company estimates that 500,000 fleet vehicles in its northern and central California territories are capable of operating on CNG.

In April, Shell and PG&E opened a CNG fueling facility at a Shell station in Sacramento.

PG&E began using CNG vehicles in its own fleet in 1973 and plans to have 500 in operation by the end of 1992.

- Two buses operated by the city of Colorado Springs, Colo., are testing high-altitude emissions of a CNG/diesel dual-fuel vehicle. A two-year, $370,000 study is sponsored by the federal Mass Transit Administration, Colorado Springs Gas Dept., Colorado Interstate Gas Co., and Colorado Transit Management Inc. The city will pay 50-60¢/gal. gasoline equivalent for about 40,000 gal./yr. of CNG.
- Phillips 66 opened CNG fueling facilities at two of its retail outlets. One is at Stroud, Okla., on the Turner Turnpike, said to be the first commercial retail CNG outlet on a U.S. turnpike. The other is near I-40 in Oklahoma City. Oklahoma Natural Gas Co. is supplying the fuel. The state makes funds available to state agencies for conversion to cleaner-burning fuels, including CNG.
- Natural Fuels Corp., Denver, and Southern Union Co., an Austin, Texas, utility, joined forces to build a chain of CNG fueling stations and conversion centers in Texas, Oklahoma and Arizona. First targeted cities are Austin and El Paso in Texas and Flagstaff in Arizona.
- The California Air Resources Board (CARB) certified the first alternative fuel engine for use in the state—a CNG engine for use in school buses. This certification enables manufacturers to mass produce alternative fuel vehicles for sale in California.
- Tren-Fuels Inc., Austin, Texas, will provide mobile CNG delivery vehicles to the Houston Metropolitan Authority and Capital Metro in Austin. Its Gasmaster 2000 system, carried on an 18-wheel truck-trailer, compresses, transports and dispenses natural gas directly into vehicles or storage tanks.

An affiliate of Tren-Fuels, Texas Gas Transmission Corp., says the system delivers CNG for less than $1/gal. gasoline equivalent. The equipment is said to be able to fuel 100 light-duty vehicles and 50 minibuses simultaneously.

- Austin's city council voted to launch a pilot program to convert 20 city vehicles to CNG. Based on results of a monitoring program, the city will decide whether to

How to Market CNG

Financial assistance is available for oil marketers who want to get into compressed natural gas (CNG) marketing, but at this point choices are few and the going could be rough. Without financial assistance, forget it.

For example, marketers would need to invest as much as $350,000 on a single two-hose CNG dispenser at an existing station, industry sources say. They would also most likely have to be located in a large urban market where fleet customers were available for CNG vehicle conversion.

Gas utility financing is becoming widely available, but only for major or other large oil companies at this time.

Some private companies offer financing, and there will likely be others in the future. One company offers a lease-purchase financing plan to marketers. The same company will also go into a joint venture with investors and a marketer or marketers.

Another company will go into joint ventures with marketers if their suppliers are behind them. In one case an oil company says it would consider working with a marketer to enter the CNG business.

A marketer interested in the business would do well at the outset to bone up on CNG technology, which is different from that of gasoline. Compressor size, for example, determines how many customers a station can handle.

Paul Nelson, vice president of Natural Fuels Corporation, a Denver-based alternative fuels marketer, estimates initial equipment costs at $125,000-$200,000 with construction costs adding another $125,000-$150,000. Included in construction would be the laying of pipe in the ground between the compression unit and the dispenser. The final price tag would depend on the size of the compressor installed.

Chris Haire, general manager of marketing and business development for Fina Oil and Chemical, says the typical MPD gasoline dispenser costs the company $10,000 and $15,000 installed, while the CNG dispensers it's putting in range between $15,000 and $22,000.

In Vancouver, British Columbia, where BC Gas operates 48 CNG units at existing gasoline stations, the price tag for equipping a public station with a 200-cfm (cubic feet per minute) compressor with one dispenser and two hoses comes to about $260,000, says Glen Magel, manager of Natural Gas Vehicle (NGV) sales and service.

The size of the compressor will be determined by the number of vehicles served in a given period and the frequency with which they need to be filled, Magel says. Magel adds that most of the public stations in the Vancouver area have 200-cfm compressors. They dispense approximately 60,000-370,000 gal. of gasoline equivalent annually, depending on their location.

The compression facility, storage tanks, a dispenser and some sort of readout or metering device linked by piping and electrical conduits make up the key components of a CNG station.

Christopher Pedersen, vice president of finance for Tren-Fuels, an Austin, Texas-based consulting and financial services firm specializing in CNG projects, says marketers who initially plan to serve 10-30 NGVs can start with one dual dispenser, 30,000-cu.ft. to 60,000-cu.ft. of storage capacity and a small 50-cfm compressor.

But in order to market CNG to larger fleet customers and serve 30-50 NGV/day it will require larger capacity compressors—100-cfm to 200-cfm—two or more dual dispensers and expanded storage capabilities, Pedersen explains. CNG stations receive fuel from the local gas utility, which delivers it to the station through a meter similar to those used in private residences.

CNG requires relatively little storage on site and the need to truck in fuel is eliminated. An average station would store 500-2,000 equivalent gallons of CNG, and the fuel source is available 24 hours a day, Nelson says. "The gas comes in on your meter just like it comes into your house," Nelson says. "At the compressor it is put under 3,600-psi of pressure and is routed into the storage bottles.

Essentially CNG fuels by displacement," Nelson explains.

"For example, the tank on the vehicle might be at about 100-psi because it has just about run out...so with storage bottles with 3,600-psi of CNG at the other end of the line, you fuel by displacement of pressure."

Nelson says CNG fueling also can be done directly from the compressor, with the size of the compressor determining the amount of storage required.

Nelson comments that a station that uses a 50-cfm compressor would be relatively slow to fuel, requiring the gas be compressed into storage before it could be off-loaded into a fast fuel capability capacity.

On the other hand, fast-fill stations now in operation in Toronto that serve transit bus fleets have six 500-cfm compressors that shoot the fuel into the buses right from the compressors.

(Continued on page 40)

convert more vehicles to CNG or possibly dual-fuel vehicles using CNG or gasoline with the flip of a switch.

● Fina Inc., Dallas, and Lone Star Gas Co., Dallas, planned to install the first public CNG refueling station in the Dallas/Fort Worth area this year. By year-end, Fina will open CNG fueling facilities at Fina stations in areas where there are commercial and government fleets that would patronize them.

● Amoco Corp., Chicago, has joined with eight other companies to conduct a three-year fueling facility research project in Washington, D.C. The others are Washington Gas Light, American Gas Assn., Gas Research Institute, Natural Gas Vehicle Coalition, Columbia Gas, Consolidated Gas, Tenneco and Southern California Gas. Because regulations ban selling the CNG for resale, the fuel will be sold only to the fleet vehicles of the participant companies and their guests.

Jointly with Natural Fuels, Amoco is operating CNG fueling facilities at two of its stations in Denver and Boulder, Colo. The one in Denver is located in a commercial/industrial area not far from downtown. The CNG dispenser is self-serve and designed to take about five minutes to fill. The price of CNG at the station in April was 64.9¢/gal. gasoline equivalent.

The Boulder station is across the street from the University of Colorado. Amoco reported sales of 1,500 gal. of CNG in March.

● Southern California Gas Co. announced plans to spend $18-million to build 51 new CNG stations in southern California by 1993. The purpose is to speed up development of a larger CNG chain by oil companies and other private firms.

SoCal Gas's aim is to help put 80,000 natural gas vehicles on the road, supported by a network of 1,300 CNG stations, by the year 2000. The target market is 600,000 buses, vans, trucks and other fleet

(Continued from page 39)

The public stations operated by Natural Fuels are typical of the CNG units now in use in that they use a simple fueling process at self-serve dispensers. "It is like putting air in your tire," Nelson says. "When you shoot the air in, it doesn't spill on your shoes. It rises if it leaks and it is a simple, clean process."

Nelson adds that the stations are required to meet National Fire Protection Assn. safety standards that set rules for spacing between dispensers. Everything is explosionproof on the island—including the lighting—and all dispensers are configured with a detachable hose. "If an absent-minded customer drove off with the dispenser, it would pop right off the coupling and that shuts off the gas," Nelson says.

He says that if somehow someone drove over the dispenser it would affect the pressure through the line and shut the gas off at the compressor and at the dispenser "so a flame shouldn't have access to the entire store."

Industry officials say a petroleum marketer considering the installation of a CNG unit should contact the local gas utility or fire marshal for local safety requirements.

At present there are several different approaches available to finance a CNG station. The most prevalent involves partnerships between gas utilities and major oil company retailers. Amoco, Unocal and Shell are all participating in ventures with large utility company partners in which the utility provides the capital for the investment and the oil company retailer provides the space for the CNG unit.

In what some industry observers view as a stronger commitment by an oil company to CNG marketing, Fina recently announced a joint venture with Lone Star Gas to set up CNG units in the Dallas-Fort Worth area. In this case, the oil company is making the investment in the equipment.

"Fina is saying there is enough potential in the CNG industry that they will go ahead and pay for the equipment up front," says Pedersen. "That makes them different from other major oil companies."

Pedersen says Tren-Fuels also offers a lease-purchase financing plan to marketers that would enable them to lease the CNG equipment. Payments under the lease-purchase agreement can be graduated so that they are lower in the initial stages when sales volumes are low.

Under the plan, the lease payments would increase as the anticipated volumes grow. At the end of a three to five-year period the retailer would own the equipment.

Another approach, Pedersen notes, is one in which several companies form a venture to provide the capital for a CNG facility at a retail station. Under this arrangement, revenues from the CNG sales would then be split between the Tren-Fuels investors and the marketer.

Natural Fuels Corp. says it seeks joint ventures with retailers either directly with an oil company or with a marketer "with the blessing of the oil company."

Nelson says the company looks at projects in major cities where "we are splitting capital costs, and bringing our know-how and maintenance skills to these facilities."

Industry observers say the financing approaches will help CNG marketers move out of the demonstration period and into the next phase, which is to gain widespread acceptance by fleet users. This is a necessary step, marketers say, before there can be broad acceptance of CNG by the average motorist.

The availability of a sufficient number of NGVs obviously is critical to the success of a CNG station. "We choose a site according to where there is an abundance of vehicles," Magel says. At Natural Fuels, Nelson says the company is building stations in Colorado and converting vehicles to CNG at the same time. "Until you get the vehicles converted, the stations are going to be just white elephants," he says.

Nelson says this is another reason why CNG marketers should consult with the local gas utility for advice on entering the market. "The utility may be doing some of its own vehicle conversions, which could drive some demand," he explains.

Nelson adds that most of the utilities "don't want to be in the fueling business. They want someone else to do it."

BC Gas has a network of installers in the Vancouver area that convert vehicles to CNG. Magel says the company approaches gasoline stations and auto repair shops that already do exceptional work on conventional systems and trains them to make the CNG conversions.

The CNG system comes in a kit for specific model vehicles and snaps on to the vehicle's existing system, creating a dual-fuel system that can be switched back and forth.

The cost of converting a vehicle to a CNG system in Canada is about $2,600-$2,800, roughly the same as in the United States.

National Fuel Corp.'s Nelson says the conversion and service centers require a significant amount of welding and must meet warranty requirements that make them best suited to a location separate from the fueling facility. But while the conversion process is centralized, he says maintenance on NGVs could easily be done at service garages at existing stations, adding an incremental profit center for the marketer.

Fina's Haire says there have been no discussions to date on any plan to install a CNG unit at a marketer-operated station. But he says the company would be glad to discuss the possibility with marketers who would be interested.

The prospect for possible CNG joint ventures with jobbers is still two or more years out, Haire says. "But the time frame is contracting," he adds.

—Phil Shook, NPN Correspondent

Fueling a natural gas vehicle is as easy as filling a tank with gasoline, and it "will not get on your hands."

vehicles that are expected to be operating in southern California.

Most of the stations will be located at fleet fueling facilities, which SoCal Gas is encouraging to be open to the public. About 10 will be located in SoCal Gas yards. Six will be located at oil company stations and completely open to the public.

In addition to providing fueling stations, SoCal Gas will encourage the purchase of compressed natural gas vehicles by helping fleet owners pay up to 50% of the extra costs of the first production models. As a further incentive, the company will price the fuel at less than 80¢/gal. gasoline equivalent.

CNG virtues

Compressed natural gas has a lot going for it. It's plentiful, widely available, cheap and clean—and reduces oil consumption and imports. If it didn't cost so much to make a CNG vehicle or convert one to CNG, and if it didn't cost a quarter of a million or a million dollars or more to install a two-hose dispenser, CNG might already have cut a wide swath in motor-fuel marketing.

With heavy environmental pressures for cleaner air, however, and a national desire to reduce foreign imports, the balance may be tipping toward natural gas—especially with natural gas customers paying for subsidization of CNG.

Natural gas is a plentiful resource. In a 1989 report, a team at the Colorado School of Mines estimated that total recoverable U.S. natural gas resources are 983-trillion cu.ft., the equivalent of 58 times current annual production levels.

The American Gas Assn. projects that annual supplies of available natural gas will increase steadily through the year 2010, with a potential annual supply rate of more than 24-trillion cu.ft. Natural gas consumption in the U.S. in 1991 is expected to be about 18.8-trillion cu.ft.

If 8-million to 10-million fleet vehicles were operating on natural gas in the United States—about 5% of the nation's total transportation fuel market—only about 1-trillion cu.ft. of additional natural gas would be needed for this purpose, or less than 6% of current consumption.

The national natural gas distribution system, containing a base of 1.2-million miles of underground pipelines, is already in place. All 50 states and major metropolitan areas have access to gas service.

With plentiful supplies and flat demand, natural gas prices have fallen through the floor. The futures price on the New York Mercantile Exchange hit $1.12/Mcf (thousand cu.ft.) in June, down more than 20¢ in a month and more than 40¢ in a year.

The retail price of compressed natural gas is about 70¢/gal. gasoline equivalent (see graph on page 38).

CNG emissions of air pollutants are, almost across the board, less than those of other motor fuels. The only fuel close is propane (see table). New technology is lowering CNG emissions even more.

A compressed natural gas distribution infrastructure is currently developing. The American Gas Assn. reports that 328 CNG refueling stations for vehicles are in operation in the United States, with about one-third of them open to the public. This number is expected to double in the next 18 months.

Some 30,000 NGVs are on the road, using 5-billion cu.ft. of natural gas annually. This is not much compared with the 18.8-trillion cu.ft. of natural gas expected to be consumed in the United States throughout 1991.

AGA projects 4-million NGVs on the road in 2005 with a consumption of 600-billion cu.ft. annually, 120 times more than today.

CNG appears to be better than any other motor fuel in accomplishing today's U.S. environmental objectives. Although apparently limited mostly to fleet use for now, it looks commercially viable at this time even without economics of scale. Gasoline and diesel fuel are far too dominant even to imagine their being displaced, but natural gas is clearly seeking its place in the sun. NPN

Amoco is testing a CNG facility in the Denver market.